REMARKS

Claims 1-16 remain pending in this application.

Specification Amendments

Various editorial amendments are made in the specification. No new matter is added by this amendment.

Request for Supplemental Form PTO-892

Applicant notes that the Form PTO-892 that accompanied the Official Action does not list U.S. Patent No. 6,348,704 (Teraguchi) although this reference is cited against applicant's claims. Applicant accordingly requests that a supplemental Form PTO-892 be issued that identifies this reference.

Information Disclosure Statement

Applicant filed an Information Disclosure Statement on January 11, 2005 subsequent to issuance of the outstanding Official Action. Applicant looks forward to receipt of an initialed Form PTO-1449 acknowledging consideration of the prior art identified therein.

Allowable Subject Matter

Applicants thank the Examiner for the indication of allowance of the subject matter of claims 14 and 15. However,

for the reasons set forth in detail below, all pending claims are believed to be directed to allowable subject matter.

Rejection under 35 USC 103(a)

Claims 1-13 and 16 stand rejected under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,348,704 in view of U.S. Patent No. 6,482,711. This rejection respectfully is traversed.

By way of review, applicants' invention is directed to a heterojunction bipolar transistor (HBT) comprising a collector layer, a base layer and an emitter layer, wherein the collector layer, the base layer and the emitter layer have different lattice constants of a_c, a_b and a_e respectively, and a value of a_b is between values of a_c and a_e.

Preferred embodiments are defined in claims 2 and 3 wherein the relationship between a_c, a_b, and a_e is defined as being either $a_c < a_b < a_e$, or $a_c > a_b > a_e$.

The relationship between the respective lattice constants enables the transistor to exhibit greater activation energy, and therefore, a longer lifetime than those of a convention heterojunction bipolar transistor. The Examiner's attention is directed to paragraphs [0013]- [0016] of the specification.

The Examiner acknowledges at page 2 of the Official Action that the '704 patent "does not expressly teach the value of a_b is

between the values of a_c and a_e." The Examiner therein acknowledges that the '711 patent also does not teach that "the value a_b is between values of a_c and a_e".

Despite the fact that claim 1 requires the value of a_b to be between the values of a_c and a_e, and the fact that the references are acknowledged to be silent as to this limitation, the Examiner takes the position that this limitation is still an obvious variation of the cited references given the teachings of Nguyen (col. 2, lines 1-4 and 46-50) such that the value of a_b should be between a_c and a_e in order to "have superior transport properties that result in BJTs with very high speed and to provide opportunities for greatly reduced power consumption".

The Examiner's position is without basis.

While the Examiner asserts that both references teach a_b values between a_c and a_e, applicant finds no such express teaching in the references. Applicant finds no teaching that suggests the relationships $a_c < a_b < a_e$ or $a_c > a_b > a_e$. Instead, the references teach substantial equality of a_c, a_b, and a_e.

With regard to the sixth embodiment of the '704 patent, the Examiner states that a collector layer 64, a base layer 65, and an emitter layer 66 have different lattice constants. However, since the collector layer 64 and the emitter layer 66 are made of the same material $Al_{0.3}Ga_{0.7}N$ having lattice constants of 3.13Å, the collector layer 64 and an emitter layer 66 have the

same lattice constant a_c and a_e 3.13Å. The base layer 65 is made of NbN of which the lattice constant a_b is 2.97Å.

It is noted that since $Al_xGa_{1-x}N$ has a lattice constant of from 3.11Å (x=1) to 3.16Å (x=0), the lattice constant for $Al_xGa_{1-x}N$ (3.11 to 3.16Å) is always larger than the lattice constant of NbN (2.97Å). Therefore, a_c and a_e are equal to each other, and both greater than a_b. It is clear that the resulting relationship for a_c, a_b and a_e does not meet the claimed relationship.

This distinction pertains both to the disclosed sixth embodiment of the '704 patent as well as to the disclosed second embodiment of the patent (column 5, lines 61-65).

The '704 patent discloses additional embodiments having lattice constant values. The third embodiment (column 6, lines 31-37) teaches lattice constant values for a_e (3.26Å), a_b (3.26 Å), and a_c (3.27 Å). The seventh embodiment (column 9, lines 18-24) teaches lattice constant values for a_e (3.26 Å), a_b (3.26 Å), and a_c (3.26 Å). Again, none of the disclosed sets of lattice constants meet the relationship recited in applicant's claim 1.

Indeed, it is the intent of the '704 patent to have the respective lattice constant values be as equal to one another as possible. See column 2, lines 52-57; column 6, lines 30-31 and 37; and column 9, lines 17-18 and 24.

In view of the above, it is clear that the '704 patent neither discloses nor suggests the claimed invention.

The additionally-cited '711 patent does not cure the deficiencies of the '704 reference.

The Examiner makes reference to only a single portion of the '711 patent in support of the rejection. When one of ordinary skill in the art reads the noted portion (column 2, lines 33-50), it is readily understood that the patent deals with two different types of substrate materials - i.e., InAs and GaSb.

The '711 patent first discusses an HBT where an InAs substrate is used, and compositions of an emitter, a base, and a collector are latticed matched to the InAs substrate. That is, a_c, a_b and a_e are all matched to a lattice constant of the InAs substrate of 6.0583 Å.

The intent of the patent is as follows. An HBT where a GaSb substrate is used and where compositions of an emitter, a base and a collector are lattice-matched to the GaSb substrate can be realized by selecting these compositions to be lattice-matched to the GaSb substrate of 6.09593 Å. The compositions of the emitter, the base and the collector in the latter HBT (on the GaSb substrate) are slightly different (or changed) from the corresponding compositions in the former HBT (on an InAs substrate) since GaSb shows a slightly different lattice

constant from that of InAs (i.e., the respective values for a_c, a_b and a_e of the former HBT are different from the a_c, a_b and a_e of the latter HBT).

It is thus believed to be the intent of the '711 patent that the respective values of a_c, a_b and a_e are as identical as possible to each other.

Further, none of the exemplified values of a_b, a_c or a_e of the cited patents meet the recited limitation of claim 1, and there is no suggestion (absent a hindsight reconstruction of the reference) that would suggest the claimed relationship between a_b, a_c and a_e.

There is further no combination of the teachings of the cited references that will result in the claimed invention.

Given the deficiencies of the references in relation to claims 1, 2 and 3, the remaining dependent claims under rejection should also be found to patentably distinguish over the cited prior art.

The rejection is accordingly without basis and should be withdrawn.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact James W. Hellwege (Reg. No. 28,808) at the telephone number of the undersigned below, to conduct an interview

in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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